WHAT IS CLAIMED IS:

subject 1. A method for selecting and modifying the shape of eyeglasses utilizing a system, said method comprising the steps of:

receiving at least one image of a person's face and storing the received image in an image database;

displaying the stored image to a user;

displaying to the user a plurality of styles of glass-frames available through the system;

receiving a style selection by the user;

receiving the position of the center of the pupils in the image;

determining the axis of symmetry of the person's face and an approximate contour of the face as an elliptical two-dimensional template;

determining a proper size of the selected frame; and

generating a virtual image of the person wearing the selected frame by superimposing the image of the glass-frame to the image of the face.

2. A method in accordance with Claim 1 wherein said step of determining a proper size of the selected frame comprises the step of utilizing a two-dimensional template to determine a position of eyes on the displayed image.

3. A method in accordance with Claim 1 further comprising the step of refining the position of the center of the pupils to subpixel precision utilizing template matching.

4. A method in accordance with Claim 1 further comprising the step of determining the position of features on the person's face

5. A method in accordance with Claim 1 further comprising the step of receiving a frontal image of the person's face and storing the frontal image in a database.

6. A method in accordance with Claim 1 wherein the system includes a server connected to at least one user device, said method further comprising the step of accessing the server via the user device.

7. A method in accordance with Claim 6 wherein the server is connected to the user device via a network.

8. A method in accordance with Claim 7 wherein the network is one of the Internet, an intranet, and a wide area network.

9. A method in accordance with Claim 1 wherein said step of receiving at least one image comprises the step of receiving two or more images of the person's face simultaneously obtained from two or more cameras oriented in a particular configuration.

10. A method in accordance with Claim 9 further comprising the steps of:

estimating the epipolar geometry of the configuration of the cameras; and

generating a three-dimensional model of the person's face.

11. A method in accordance with Claim 10 further comprising the steps of:

determining pixel correspondence along scan-lines using normalized correlation with sub-pixel interpolation;

determining the depth corresponding to each pixel utilizing triangulation; and

generating a three-dimensional mesh of the position of the pixels.

12. A method in accordance with Claim 11 further comprising the steps of:

fitting a three-dimensional template of a face to the generated three-dimensional mesh;

generating an image of the three-dimensional model of the face; and

superimposing the glass-frame model to the person's face model to generate a virtual image of the person's face wearing the glass-frames.

13. A method in accordance with Claim 1 further comprising:

representing the shape of the lens using a parameterized curve or a piecewise linear curve wherein the shape depends upon the position of a number of control points;

representing the shape of the lens and the front rim using a constrained parameterized curve, wherein the lens shape depends upon the position of the control points; and

constraining the position of the control points to maintain the perimeter of the rim approximately constant and to maintain the tangent at the hinge and bridge, and the maximum curvature below a prescribed bound determined by the properties of the frame.

14. A method in accordance with Claim 13 further comprising the step of modifying the selected glass-frame style by changing the position of the control points while maintaining the perimeter approximately constant.

15. A method in accordance with Claim 13 further comprising the steps of:

maintaining the tangents of the selected glass-frames at the hinges and bridge constant; and

modifying a selected style to have a prescribed perimeter, while minimizing the distortion from the style selected by the user.

16. A method in accordance with Claim 1 further comprising the steps of:

associating a position of a set of control points to a set of perceptual qualities stored in a database; and

modifying the shape of the lens based upon perceptual qualities.

17. A method in accordance with Claim 16 wherein said step of modifying the shape of the lens comprises the step of modifying the shape of the lens based upon perceptual qualities chosen by the user.

18. A method in accordance with Claim 17 further comprising the steps of:

storing selected designs;

comparing the stored designs;

performing collaborative filtering; and

recommending to the user shapes and styles according to selections of other customers that best match the choices of the current customer.

19. A method in accordance with Claim 1 further comprising the step of controlling a lens grinding machine in accordance with data received by the system.

20. A method in accordance with Claim 1 wherein the system includes a database of maps between the geometry of the glass-frame, represented by the position of a number of control points, and the perceptual quality of the shape, said method further comprising the steps of:

modifying the selected shape by specifying the amount of each descriptive quality;

adapting the database to particular clientele; and

performing collaborative filtering to suggest shapes and a style that matches the choices of other customers with potentially similar preferences.

21. A method in accordance with Claim 20 wherein the database is one of a learning database utilizing psychophysical experiments and empirically established database.

22. A method in accordance with Claim 1 further comprising the step of modifying the selected style and shape of the frame while satisfying constraints due to manufacturing process and inventory.

23. A method in accordance with Claim 22 further comprising the steps of:

evaluating the constraints within which any given frame can be modified; and

enforcing the constraints during frame modification.

24. A method in accordance with Claim 1 further comprising the step of receiving prescription data for the lenses.

25. A method in accordance with Claim 1 further comprising the step of transmitting shape and style data to a manufacturer who ships the selected eyeglasses directly to the customer.

26. A method in accordance with Claim 1 further comprising the steps of:

selecting landmark points of the person's face;

tracking the selected points through time as the person moves their head; and

estimating the three-dimensional motion of the landmark points on-line.

27. A method in accordance with Claim 1 further comprising the step of generating a two and a half dimensional model.

28. A method in accordance with Claim 27 further comprising the step of selecting a feature template for relevant facial features.

29. A method in accordance with Claim 28 further comprising the steps of:

tracking the position of the feature templates from frame to frame; and

selecting a reference frame.

30. A method in accordance with Claim 29 wherein said step of selecting a reference frame comprises the steps of:

selecting a reference frame from one of a 2-D Euclidean, 2-D Affine, 2-D Projective, and 3-D Euclidean; and

estimating a transformation.

31. A method in accordance with Claim 30 further comprising the step of using the estimated transformation to modify the appearance of a glass-frame template.

32. A method in accordance with Claim 1 further comprising the step of creating a virtual image of the person's face moving and wearing the frames.

33. A system for selecting and modifying the shape of eyeglasses, said system comprising:

a device; and

a server connected to the device and configured to receive information from a user via said device, said server further configured to:

receive at least one image of a person's face and store the received image in an image database;

display the stored image to the user;

display to the user a plurality of styles of glass-frames available through the system;

receive a style selection by the user;

receive the position of the center of the pupils in the image;

determine the axis of symmetry of the person's face and an approximate contour of the face as an elliptical two-dimensional template;

determine a proper size of the selected frame; and

generate a virtual image of the person wearing the selected frame by superimposing the image of the glass-frame to the image of the face.

34. A system in accordance with Claim 33 wherein said server further configured to utilize a two-dimensional template to determine a position of eyes on the displayed image.

35. A system in accordance with Claim 33 wherein said server further configured to refine the position of the center of the pupils to subpixel precision utilizing template matching.

36. A system in accordance with Claim 33 wherein said server further configured to determine the position of features on the person's face.

37. A system in accordance with Claim 33 wherein said server further configured to receive a frontal image of the person's face and store the frontal image in a database.

38. A system in accordance with Claim 33 wherein said server is connected to the device via a network.

39. A system in accordance with Claim 38 wherein the network is one of the Internet, an intranet, and a wide area network.

40. A system in accordance with Claim 33 wherein said server further configured to receive two or more images of the person's face simultaneously obtained from two or more cameras oriented in a particular configuration.

41. A method in accordance with Claim 40 wherein said server further configured to:

estimate the epipolar geometry of the configuration of the cameras; and

generate a three-dimensional model of the person's face.

42. A system in accordance with Claim 41 wherein said server further configured to:

determine pixel correspondence along scan-lines using normalized correlation with sub-pixel interpolation;

determine the depth corresponding to each pixel utilizing triangulation; and

generate a three-dimensional mesh of the position of the pixels.

43. A system in accordance with Claim 42 wherein said server further configured to:

fit a three-dimensional template of a face to the generated three-dimensional mesh;

generate an image of the three-dimensional model of the face; and

superimpose the glass-frame model to the person's face model to generate a virtual image of the person's face wearing the glass-frames.

44. A system in accordance with Claim 33 wherein said server further configured to:

represent the shape of the lens using a parameterized curve or a piecewise linear curve wherein the shape depends upon the position of a number of control points;

represent the shape of the lens and the front rim using a constrained parameterized curve, wherein the lens shape depends upon the position of the control points; and

constrain the position of the control points to maintain the perimeter of the rim approximately constant and to maintain the tangent at the hinge and bridge, and the maximum curvature below a prescribed bound determined by the properties of the frame.

45. A system in accordance with Claim 44 wherein said server further configured to modify the selected glass-frame style by changing the position of the control points while maintaining the perimeter approximately constant.

46. A system in accordance with Claim 44 wherein said server further configured to:

maintain the tangents of the selected glass-frames at the hinges and bridge constant; and

modify a selected style to have a prescribed perimeter, while minimizing the distortion from the style selected by the user.

47. A system in accordance with Claim 33 wherein said server further configured to:

associate a position of a set of control points to a set of perceptual qualities stored in a database; and

modify the shape of the lens based upon the stored perceptual qualities.

48. A system in accordance with Claim 47 wherein said server further configured to modify the shape of the lens based upon perceptual qualities chosen by the user.

49. A system in accordance with Claim 48 wherein said server further configured to:

store selected designs;

compare the stored designs;

perform collaborative filtering; and

recommend to the user shapes and styles according to selections of other customers that best match the choices of the current customer.

50. A system in accordance with Claim 33 wherein said server further configured to control a lens grinding machine in accordance with data received by the system.

51. A system in accordance with Claim 33 wherein said system further comprises a database of maps between the geometry of the glass-frame, represented by the position of a number of control points, and the perceptual quality of the shape, said server further configured to:

modify the selected shape by specifying the amount of each descriptive quality;

adapt the database to particular clientele; and

perform collaborative filtering to suggest shapes and a style that matches the choices of other customers with potentially similar preferences.

52. A system in accordance with Claim 51 wherein said database comprises one of a learning database utilizing psychophysical experiments and an empirically established database.

53. A system in accordance with Claim 33 wherein said server further configured to modify the selected style and shape of the frame while satisfying constraints due to manufacturing process and inventory.

54. A system in accordance with Claim 53 wherein said server further configured to:

evaluate the constraints within which any given frame can be modified; and

enforce the constraints during frame modification.

55. A system in accordance with Claim 33 wherein said server further configured to receive prescription data for the lenses.

56. A system in accordance with Claim 33 wherein said server further configured to transmit shape and style data to a manufacturer who ships the selected eyeglasses directly to the customer.

57. A system in accordance with Claim 33 wherein said server further configured to:

select landmark points of the person's face;

track the selected points through time as the person moves their head; and

estimate the three-dimensional motion of the landmark points on-line.

58. A system in accordance with Claim 33 wherein said server further configured to generate a two and a half dimensional model.

59. A system in accordance with Claim 58 wherein said server further configured to select a feature template for relevant facial features.

60. A system in accordance with Claim 59 wherein said server further configured to:

track the position of the feature templates from frame to frame; and

select a reference frame.

61. A system in accordance with Claim 60 wherein said server further configured to:

select a reference frame from one of a 2-D Euclidean, 2-D Affine, 2-D Projective, and 3-D Euclidean; and

estimate a transformation.

62. A system in accordance with Claim 61 wherein said server further configured to use the estimated transformation to modify the appearance of a glass-frame template.

63. A system in accordance with Claim 33 wherein said server further configured to create a virtual image of the person's face moving and wearing the frames.